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Preliminary Draft Agency Comments
Draft Smoky Canyon Mine RI/FS Site-Specific Human Health Risk Assessment, dated December 2014
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General Comments

1) A description was not found anywhere in the HHRA to whether vegetation tissue data were for washed or unwashed vegetation. For sites where washed vegetation tissue are directly measured or modeled tissue data are used, a mass loading factor (MLF) has been used to estimate what's on a plant. Other mines have used the MLF to address the potential exposure to unwashed vegetation. It's important to evaluated the material on the plants as not all users wash vegetation prior to consumptions (e.g., cattle, elk, Native Americans, etc.). These exposures may have been captured through other means (e.g., soil ingestion rates), however clarification is necessary to understand how these exposures were captured in the risk estimates. Please revise accordingly.

2) Meat and produce ingestion rates should not be reduced for cooking losses. This was not specifically addressed in the current document. Please add a brief statement that either ingestion rates were not reduced for cooking losses, or revise the ingestion rates accordingly.

3) Some of the EPA recommended exposure factors have changed since the planning documents for Smoky. Please revise and update using the recently revised CERCLA standard default exposure parameters for the residential scenario, http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew/EFH_changes_table_memo_2014.pdf.

Specific Comments

4) **Page 13, Section 3.2, 1st paragraph, last sentence:** In the screening evaluation, COIs were not identified as COPCs to be carried forward for quantitative evaluations if screening levels were not available. This is inappropriate and either other relevant screening levels (most of which had screening values in the WP and in the Screening Levels, Exposure Factors, and Toxicity Factors for Smoky Canyon Mine Site-Specific Human Health Risk Assessment memorandum) should be identified or these should be considered as COPCs and evaluated in the quantitative evaluation. RfDs and other toxicity values are available for most COIs to evaluate the risk posed by these constituents. Please revise accordingly.

5) **Page 13, Section 3.2, 5th paragraph, 3rd sentence:** It is stated that exposure to the radiological activity of uranium and its daughter products were evaluated in the hypothetical residential scenario only. It has generally been understood that radiological risk to residential receptors would be greater than that to other receptors. However, a recent analysis at the Ballard Mine indicates that other receptors can also have considerable risk from exposure to radionuclides. For example, based on Ballard exposure parameters and the Smoky Canyon uranium exposure point concentrations (from Table 4-2) of 3.41 mg/kg for residential receptors and 16.6 mg/kg for all other receptors, the following risk levels can be estimated based on Ra-226+D exposure:

Resident : 2E-04
Camper/hiker: 3E-05
Seasonal rancher: 1E-04
Hunter: 4E-05
Native American: 2E-03

This is just an example, and it does not take into account possible differences in exposure assumptions used at the sites, but it indicates that radiological exposure to receptors other than the hypothetical future resident should be evaluated.

6) **Page 13, Section 3.2, 5th paragraph, last sentence:** The U-238+D residential soil PRG is presented as 0.696 pCi/g or, expressed as a concentration, 2.07 mg/kg. However, the recently revised U-238+D residential soil PRGs are 4.96E-02 pCi/g or 1.48E-01 mg/kg. Similarly, the tap water PRGs for U-238+D are presented as 0.607 pCi/L or 0.0081 mg/kg. The current U-238+D tap water PRGs are 3.85E-01 pCi/L and 1.15E-03 mg/L. For the radiological risk analysis, please use the most recently updated version of the radionuclide PRG calculator: http://epa-prgs.ornl.gov/radionuclides/

7) **Page 16, Section 3.2.2, 2nd to last paragraph:** It is stated that boron, molybdenum and silver do not have SLVs for surface water and ground water, so they were not carried through the risk assessment, and were evaluated qualitatively instead. All of these chemicals have RfDs, and tap water RSLs. Therefore, they should be evaluated quantitatively in these media.

8) **Page 16, Section 3.2.2, last paragraph:** As noted in the *Area Wide Risk Management Plan* (IDEQ 2004), there is an elevated risk to human health from radium-226 when a residential scenario is considered. Other human exposure scenarios (e.g., recreational users, workers, etc.) are expected to have significantly lower risk, however were not evaluated during the area wide studies. The risks associated with uranium and its radioactive daughter products was identified as a data gap during the Smoky Canyon risk assessment planning phases. Specifically, the Agencies were concerned that since U-238 constitutes the majority of naturally occurring uranium, radionuclides in the U-238 decay chain such as radium-226 may be associated with unacceptable radiogenic risk under certain exposure scenarios. As planned, the Smoky Canyon HHRA used the mass concentration of uranium to conservatively estimate activity concentration of daughter products such as Ra-226. Exceedances for several radiogenic compounds were identified in Section 3.2.2, however the extent of the exceedances are not described in the text. Screening tables in Appendix D indicate that risks for the hypothetical scenarios on private lands could be several orders of magnitude above the acceptable risk range. Appendix D, Table D.13 indicated these are considered COPCs and further quantitative evaluation would occur with results to be included in the risk characterization. It does not appear that any further evaluation was conducted, nor are the potential risks associated with radiogenic exposures described in Risk Characterization (Section 6) or the Conclusions (Section 7).

   Furthermore, considering the level of the exceedances for the risks associated with exposures to radionuclides in hypothetical future residents on private lands, it's important for the HHRA to provide radiological risks estimates for other potential site users that could be exposed to radionuclides. This information is necessary to determine whether remedial actions would be necessary to protect site users other than residents. The Agencies will require that an evaluation for exposures to radionuclides be conducted that addresses the potential risks to each of the representative human receptors. To accomplish this, the Agencies suggest estimating risk using

available risk calculator tools for workers and recreators, such as provided by Oak Ridge National Laboratory at: http://rais.ornl.gov/cgi-bin/prg/RISK_search?select=rad.

9) **Page 17, Section 3.2.2, 1st paragraph:** The radionuclides that exceeded screening levels are presented here. There is no further discussion of radiological risk in the exposure assessment, risk characterization, or conclusions sections. It appears that risk from exposure to radionuclides was not estimated. The risk assessment cannot be considered complete without this information. Please address radiological risk in the risk assessment.

10) **Page 18, Section 4.0, 2nd paragraph, last sentence:** The text states "Supplemental information, including deviations from these planning documents and Site-use questionnaires, are presented in Appendix A." Please revise to provide a summary here of any deviations from the cited planning documents in the HHBRA.

11) **Page 19, Section 4.3, last paragraph:** The statement "Current human use of the Site is limited" requires additional support. Interviews (summarized in Appendix A) indicate that currently recreational use and workers conducting environmental monitoring occurs regularly.

12) **Page 20, Section 4.3, 2nd bullet:** Interviews (summarized in Appendix A) indicate that recreational users fish in the Hoopes Spring, Sage Creek and Crow Creek. Therefore, fishing at the Hoopes Spring area should also be added to the discussion in this section.

13) **Page 22, Section 4.4, 2nd paragraph, last sentence:** Please provide a slightly more detailed summary here for the average readers' understanding so they don't have to find the information in the appendix regarding changes that were made subsequent to the Agency-approved planning documents.

14) **Page 23, Section 4.5, 2nd paragraph:** With the exception of the hypothetical resident, EPCs were calculated on a Site-wide basis. Although this may be acceptable for the Site-specific scenarios at Smoky Canyon, the report needs to provide additional information here that supports the decision to group all data over such a large area.

15) **Page 24, Section 4.5, 2nd paragraph:** The approach indicates that the chemical specific transfer coefficients for estimating tissue concentrations from feed concentrations were as reported in the Air Toxics Hot Spots Program Risk Assessment Guidelines: Technical Support Document for Exposure Assessment and Stochastic Analysis (Cal-EPA, 2012). This is partially true since many were also taken from Baes et al, 1984, so both should be mentioned. Cal-EPA represents a newer guidance document that underwent significant peer review and should be preferentially utilized, which is consistent with the footnotes in Appendix F, Table F.6.1. However, not all values from Cal-EPA were used (e.g., selenium). The 0.04 transfer coefficient from Cal-EPA needs to be used instead of the 0.015 value from Baes et al.

16) **Page 24, Section 4.5, 2nd paragraph, 2nd sentence:** It is not clear that the assumption of equal concentrations of COPCs in beef muscle and organs is appropriate, at least for selenium, based

on work that has been done on selenium in elk tissue (ATSDR, 2006), in which liver was found to have considerably higher concentrations than muscle tissue. Additionally, elk tissue collected from animals harvested in the SE Idaho phosphate mining area and published in 2000 indicated that selenium and cadmium levels were often 10 times higher than measured in muscle tissue. Please clarify and revise as needed.

17) **Page 24, Section 4.5, 2nd and 3rd paragraphs:** Estimates of beef and wild game tissue EPCs requires several modeling steps and the report does not provide sufficient detail describing the equations and assumptions involved. These paragraphs indicate vegetation EPCs and chemical specific transfer coefficients for intake to tissues are used, however there is no mention of the other intake sources (i.e., water consumption and incidental ingestion of soil). It would be useful to provide the equations for modeling cattle and game tissue EPCs.

18) **Page 24, Section 4.5, 3rd paragraph:** Estimates for wild game tissue EPCs are described, however it is not apparent what receptor was used as a representative for wild game. Is it grouse, elk, deer, moose, or cattle as intake per kilogram body weight can differ significantly? Based on Appendix F Table F.7.1, it appears that cattle were used as a surrogate, which warrants justification within the report.

19) **Page 25, Section 3.1.1, 1st paragraph:** The text states that the site-wide exposure point concentrations in abiotic and biotic exposure media were represented by the 95 percent upper confidence llimit on the mean. Initially, this does not make sense in the context of disconnected fisheries such as one stream system is more affected by elevated COPC concentrations than another, but disconnected, stream system within the Site. Examples could be where water and sediment COPC concentrations from Smoky Creek are combined in the same dataset with Lower Sage Creek to develop a mean exposure point concentration. It is unclear whether or not this is accounted for in the tiered process outlined in the immediately following paragraph. Also, this reviewer can't tell from the narrative whether or not in the tiered system, EPCs from Tier 1 are carried through to Tiers 2 and 3 or if new EPCs are developed based upon the more narrow range of original data specific to those stream systems. Please clarify.

20) **Page 25, Section 4.6:** The intake discussion should describe whether any bioavailability factors were applied to the incidental soil ingestion component. For most COPCs, this factor should be 100% (or 1.0) unless site-specific data are obtained, however EPA suggests using 60% (or 0.6) as an upper-end estimate of arsenic bioavailability in soils as a default. Information supporting this is available at (1) Section 5.10 at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm and (2) http://epa.gov/superfund/bioavailability/pdfs/Transmittal%20Memo%20from%20Becki%20Clark%20to%20the%20Regions%2012-31-12.pdf

21) **Page 31, Section 3.2.1.2, Sediment:** The proposed revisions to the sediment screening values will need further discussion between Simplot and the Agencies. The previously-approved

screening values were evaluated in the context of relatively widely-accepted values and sources and were also evaluated for consistency among other FS CERCLA phosphate mine sites. The current proposed values appear to have a more limited source application and would not be consistent with similar projects.

22) **Pages 31-35, Section 6.1:** It is unclear why the risk characterization for some receptors emphasizes that no ELCR was over 1E-05 (IDEQ's point of compliance) while others indicate none over 1E-04 (high point of EPA's risk range). Consistency is preferred with the 1E-05 likely being the most appropriate for this section. In addition, since risk thresholds are based on 1 significant figure, most agencies prefer site risk results to also be presented using 1 significant figure. Please revise accordingly.

23) **Page 38, Section 6.2.1, 2nd paragraph:** Report should indicate that the ELCR for the seasonal rancher is above the IDEQ limit of 1E-05.

24) **Page 43, Section 6.3.5:** It is stated that boron, molybdenum and silver did not have SLVs for surface water and ground water, and were screened because they did not exceed SLVs for soil and sediment. These chemicals have toxicity values, and should have been evaluated quantitatively in the risk assessment. Please revise accordingly.

25) **Table 3-2:**

a) The units shown for the source material/soil radionuclide screening levels are pCi/L. The units should be pCi/g. Please correct.

b) Groundwater screening levels appear to be the lower of the IDEQ Risk-Based Levels or the MCLs, however the MCL for uranium was not included and needs to be added.

26) **Table 4-1:**

a) The standard default exposure factors have recently been updated (EPA, 2014). For example, the adult resident water drinking rate is now 2.5 L/day, and the recommended adult body weight has changed from 70 kg to 80 kg. Please incorporate revised EPA standard default exposure factors.

b) RME exposures are intended to express a reasonable maximum exposure and its associated risk. A RME exposure frequency of 6 days per year for the hunting scenario would not be a reasonable maximum for future site use. Other mines (e.g., Ballard Mine) in the SE Idaho phosphate patch have used 14 days, which is more reasonable for a maximum exposure. This is supported by the interviews conducted for the Smoky Mountain Mine investigation (summary provided in Appendix A) where hunters indicated they hunt on site from 1 to 20 days/year.

c) A RME exposure frequency of 180 days per year for the hypothetical resident is low and inconsistent with exposures used at other phosphate mines. The RME should be at least 270 days per year, which would be consistent with the frequency used at the Ballard Mine and with

the residential exposure frequency for direct contact pathways in the Idaho Risk Evaluation Manual (IDEQ, 2004).

Editorial Comments

27) Page 2, Section 1.1, 1st paragraph, 3rd sentence: Change COIs to COCs.

References

ATSDR, 2006. Health Consultation. Evaluation of selenium in elk in the Southeast Idaho Phosphate Resource Area, Bannock, Bear Lake, Bingham, Caribou Counties, Idaho. August 14, 2006. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Atlanta, Georgia.

EPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Memorandum from Dana Stalcup to Superfund National Policy Managers, Regions 1-10. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington D.C. February 6, 2014.

EPA Comments on the
Draft Final Feasibility Study Red Devil Mine, Alaska

Previous Comments Not Addressed:

Section 1.2.4. EPA concurred in with the response to comments that stated the FS Fate and Transport section did not need to provide all of the details present in the much longer RI. However, EPA replied it should provide useful summary statements that help describe what is known or not known about the fate and transport at the site and suggested some ways to do so. For example, a summary statement such as: "On an annual basis, most contaminants leave RDM site via surface water transport during storm events. Leaching of dissolved phase contaminants into groundwater also occurs, but is considered to be a smaller flux compared to the surface pathway" (just an example…not suggesting this information is accurate portrayal of site contaminant dynamics). In two short sentences a lot of information could be conveyed that would help the reader understand the fate and transport of contaminants at the site. Alternatively, if the contaminant dynamics are too complex for this sort of summarization then a different sort of sentence could be written such as: "Due to the heterogeneous nature of the RDM contamination, generalizations regarding the flux mechanisms cannot be made; however two of the main site contaminants (Hg and As) have been shown to leave the site predominantly through surface water entrainment of particles during storm events". Or if such information does not exist for the site, then this would also be important to state, such as: "The relative importance of surface versus subsurface pathways of contaminant transport at the site is not known. It is not clear if most of the contamination leaves the site in the dissolved phase or associated with particles." Short summary statements such as these would be helpful to include in the FS.
The text of the final FS does not provide the type of summary information on the fate and fate and transport that was requested above. For example, there is not any information on the relative importance of the surface and groundwater transport pathways, the importance of storm events on Hg transport, or the form (i.e. dissolved vs particulate) of Hg being transported.
BLM Response: *The FS Fate and Transport section will be revised to include a brief summary statement about the important transport pathways at the site.*

P. 1-11, Sect. 1.2.4, 4th parg. The earlier comment was that the sentence "Tailings and waste rock are leachable and make up the primary source of contaminants to groundwater and surface water." implied that the mercury in the surface water is primarily from leaching and as such would be in the dissolved phase. This is the opposite of what is shown in Table 4-31 in the RI Report, where the vast majority of the mercury can often be transported in the particulate phase. EPA questioned if annual export loads from the surface water had been calculated and it has been determined that on an annual basis, the dissolved phase is actually more important that particulate transport.
After reviewing the response to the comment EPA agreed that annual loading calculations may not be critical to evaluate the feasibility of the alternatives. However without this information, EPA questioned whether statements indicating that the dissolved phase is the "primary source of contaminants" can be made because the relative importance of the dissolved versus particulate transport on an annual basis has not been measured or estimated. Because there are large difference of dissolved versus particulate bound Hg to become methylated and accumulate in aquatic/terrestrial biota; this understanding would help highlight the benefits of different remediation scenarios.

BLM Response: *The final RI report Fate and Transport chapter has been extensively expanded to more fully discuss the transport of mercury in groundwater and surface water at the site. The newly revised RI chapter includes detailed discussion regarding colloidal transport of mercury in groundwater and surface water. The final FS will be revised to include a brief summary of these transport mechanisms.*

The text of section 1.2.4. Contaminant Fate and Transport was not revised to indicate that mercury transport occurs as both in the dissolved and particulate phase. In addition, the text of the final draft continues to indicate that the "primary" source of Hg is in the dissolved phase, without providing any information that has shown the dissolved phase to be more important than particulate transport. This text should be revised.
BLM Response: *See response to comment above.*

General Comments:
This Feasibility Study should include an alternative that consolidates all the large areas of contamination in one on-site repository. Specifically such an alternative should include moving Monofill 2 to the on-site alternative. Currently, Alternative 3 is the on-site remedy but leaves Monofill 2 in place. Alternative 4 removes most all the contamination, including Monofill 2, to an off-site location. There should be an alternative that evaluates the consolidation of Monofill 2 with the rest of the material into the on-site repository. This reduces the foot print of contamination of the entire site and reduces the mobility of the contaminated material associated with Monofill since it would be in a better engineered structure.
BLM Response: *The BLM will incorporate an alternative in a new draft of the FS that evaluates the feasibility of moving the contents of Monofill 2 into the onsite repository described under alternative 3.*

In regards to the engineered repository, the design of this repository should include a bottom liner as well as a geomembrane cover. Adding a bottom liner will increase the protectiveness of any alternatives employing on-site repository by preventing downward migration of contamination should the cover be breached and also protect against migration of contaminants from lateral flow due to near surface ground water.
BLM Response: *The BLM will develop a new draft of the FS that includes evaluating the feasibility of adding a low permeability liner to the repository described in Alternative 3. Part of that assessment will be a hydrologic analysis of potential leachate generation resulting from introduction of natural water into the repository.*

It is difficult to estimate the additional cost of moving Monofill 2 with the Alt 3 proposal based on my preliminary review of the cost tables. A quick check of these tables showed the excavation and transportation costs of Alt 3 combined. Those costs are considerably greater than the excavation costs for Alt 4 that includes excavating the Monofill. So one can assume that transportation costs are very large for Alt 3. Right? Could those be broken out as sub-values; one for excavation and one for transportation? I'm thinking it is not that much more to excavate the Monofill vs covering it w/ concrete cloth and having to monitor just the repository vs monitoring two locations. Having the excavation and transportation costs broken out would help assess that.